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A preliminary analysis modeling of the relationship between quality management practices and sustainable performance

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ABSTRACT

From the past literature, the relationship between quality practices and sustainable performance has not adequately been explored. Hence, this research attempted to further investigate the impacts of other variables that may proffer better explanation to the nature of the relationship. Therefore, the aim of this study is to examine the mediating and moderating effect of organizational excellence and environmental regulation and policy (ERP) on the relationship between TQM (quality practices) and sustainable performance by proposing an inclusive research model comprising the antecedent factors in food and beverage industry of Malaysia. Questionnaires were distributed to 303 Malaysian food and beverages companies while 168 questionnaires were returned (response rate above 50%) and PLS-SEM was used to analyze the data in order to assess the validity and reliability of the instrument. This study serves as a validation process for the developed instruments of the research with the identified constructs of the study while the preliminary analysis and results are shown. Also, the result reveals that the instruments are reliable and the analysis indicates a strong evidence of rational validity. Similarly, it reaffirms the importance of excellence for any successful strategic implementation in enhancing sustainable performance through the implementation of quality practices.

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Introduction

In today's business of changing environment, it is required for any organization to examine its internal and external environment for challenges and opportunity to maintain economic growth and remain competitive (Ramlall 2002). In order for an organization to survive and grow in such environment, seeking an excellence by leading the innovation has to be a priority. Notably, organizations in both private and public sectors are striving to sustain their performance and gain competitive advantage over other competitors. However, to enhance the performance and how to implement different strategies are the issues that need to be investigated further. The goals and core businesses of every public and private sectors determines their performance. While achieving good performance and quality and customer satisfaction are the intention of the public sector, the intention of the private sector is to achieve profit by customer satisfaction. According to Dewhurst, Martínez-Lorente, and Dale (1999), to quench the need of the society and its ability and the budget available is the objective of many public organizations. Also, privates firms have less intangible objectives and goals compared to public organizations (Cinca, Molinero, and Queiroz 2003).

The main objective of the quality management and innovative implementation is to achieve the organizational excellence. Practically, business excellence supports the organizational capacity to accept and deal with any change (Oakland Consultation 2005). Oakland Consultation (2005) pointed out that business excellence requires managers to have clear mission which can lead the organization's team to achieving its goals by delivering values and managing organizations for customers and stakeholders. Notably, Antony and Bhattacharyya (2010) stated that excellence is the most outstanding and highest level of performance; therefore, any organization should be concerned further in its performance. Nowadays, many organizations have been struggling to achieve high performance record and excellence in the bid to distinguish themselves from their rivals in the market. Unfortunately, Dahlgaard (2003) mentioned that majority of them were unable to

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achieve the goal due to lack of understanding in the concept and process of business excellence.

With the difference that the term organizational excellence is often used in public sector, the term has emerged recently to be synonymous to business excellence (McAdam 2000). In current literatures, organizational excellence is defined as a target point on the journey to achieve quality (McAdam 2000). Different organizations have different plans regarding the strategies that can help them to enhance their goals. In general, TQM is part of the most critical strategies to upgrade the positioning of an organization in the market; the practice is considered as one of the commonest applicable philosophy of management. The historical roots of TQM go back a long way; however, it is still considered as modern term (McAdam 2000). In fact, TQM has expressed as a global and systematic approach to organizational management by continuous process improvement in business performance in order to satisfy implicit and explicit anticipation of stakeholders and customers (Dean and Bowen 1994; Grant, Shani, and Krishnan 1994). Thus, the organization's purpose is not to have TQM but to adopt it to achieve excellence and to contribute in achieving competitive advantage (Mele and Colurcio 2006).

The rate at which environmental regulation and policy is being followed is used to measure environmental quality. It is a feature of the regulatory natural and social relationships and the functional significance of which are depended on the capability to reflect the maximum environmental safety process (Chervinski 2014). The customer concerns for protecting environment influence the high demand of compelling environmental regulations on production process and product end-of-life process (Santos-Reyes and Lawlor-Wright 2001). Hák, Moldan, and Dahl (2012) examined the environmental sustainability index based on environmental issues. In terms of environmental pollution, the study showed that no environmental law and conservation has been extensively discussed. The study showed that transparency and environmental accountability, adequate and information capacity for credible enforcement and policies would lead to a best performance in environmental activity performed by various institutions internationally.

In essence, there is need for a comprehensive study to develop a research model that will capture the relationship between Quality practices such as: management leadership, benchmarking, quality assurance, continuous process improvement, human resources management, service design and quality and information and analysis; and relationship with organizational excellence and sustainable performance. The quest for more studies on the relationship between these practices and sustainable performance for provision with an extensive review of the existing system of factory's quality such as implementation of standards, management, present manufacturing procedures and procurement in conjunction with economic, social and environmental development in Agro-allied industry are issues that provoked the essence of this study. The food and beverage industry which is the domain of this study is known to constitute a major source of energy in most countries. Therefore, this study will: show the analysis and the results; the validation process for the developed instrument of the research; and propose an inclusive research model comprising the quality practices of the management and sustainable performance.

Materials and method

The modeling of the study

This model of this study conceptualizes each of the constructs involved and highlights the items which are used for instrumentation of each construct. The constructs which are conceptualized are sustainable performance, organizational excellence, environmental regulation and policy and quality practices. The quality practices are: management leadership, benchmarking, continuous process improvement, service design, human resources management, quality assurance and information and analysis. Therefore, this section explores the link between sustainable performance, organizational excellence, environmental regulation and policy and the quality practices.

Sustainable performance

The proposed framework applied in this study to assess the sustainable performances is divided into three dimensions as proposed by Brent and Labuschagne (2004). The dimensions are: environmental sustainability, economic sustainability and social sustainability. Thus, in order to embrace the whole concept of sustainability, these three dimensions are critical to paddle a business successfully for now and the nearest future (Eweje 2011)

Economic sustainability performance is an evaluation of return on assets, organizational cost reduction, profits regarding the economic goals of performance, income improvement and market share promotion (Green et al. 2012; Liu, Kasturiratne, and Moizer 2012). Economic performance is measured in

terms of income, profit, tax, as well as taking care of employee's welfare financially (Zhu, Sarkis, and Lai 2012). In other word, social sustainability performance is defined as an evaluation of organization on education and training, human resources development, social commitment and participation and healthy work environment (Teraji 2009). According to United Microelectronics Corporation (2012), social responsibility comprises working condition, talent development, public welfare support, employee benefits, and social response and concern and staff relations. Lastly, environmental sustainability performance is the evaluation of organizational reduction of harmful materials, reduction in hazardous consumption or emissions and resources use or efficient energy (Junquera, Brío, and Fernández 2012). Environmental sustainability performance is an achievement derived from reducing emission of pollution, waste generation and resource usage as a result of undertaken efforts (Adewale et al. 2016; Brent & Labuschagne', 2004). The respondents are implored to indicate their views on how sustainable performance is influenced by the quality practices with the moderating and mediating effect of environmental regulation and policy and organizational excellence respectively using the 5-point Likert scale from 1 = strongly disagree to 5 = strongly agree.

Quality practices

TQM comprises different critical success factors (CSFs) simply referred to as TQM elements. As stated in the past studies, the CSFs include: process management, philosophy development, benchmarking, quality measurement, information analysis, employee empowerment, commitment and top management, leadership, customer satisfaction and involvement, supplier quality management, and training (Foster 2007). Similarly, it is revealed that adopting TQM has benefit of improving sustainable development (Izvercian et al. 2014; Todorut 2012); enhancing production performance and customer performance (Agus and Hassan 2011); direct association of TQM on operational performance (Baird, Hu, and Reeve 2011); positive impact on Labor productivity (Benavides-Chicón & Ortega 2014); impact on innovation in services organizations (Bon and Mustafa 2013) and impacts on educational system (Militaru, Ungureanu, and Creţu 2013). Similarly, several authors have studied different quality practices under quality management which lead to different results. The inconsistency in their results therefore calls for further studies. The Table 1 below presents different quality practices as mentioned in previous studies with their respective authors.

Generally, TQM is considered to be beneficial as regarded its results got from successful implementation. In all these views of scholars about TQM approaches, it was evidently established that TQM practices required team work, quality planning, quality training, continuous improvement process, management commitment, focus on customers, benchmarking, quality assurance, focus on processes and prevention. Some of all these elements are equally regarded as the core of TQM elements in this study.

Table 1. Different quality practices from previous studies.

Quality Practices	Authors
Process Management, Philosophy Development, Benchmarking, Quality Measurement, Information Analysis, Employee Empowerment, Commitment and Leadership, Supplier quality management, Top management, training and Customer Satisfaction and Involvement	Foster (2007)
Continuous and Process Improvement	Dean and Bowen (1994); Grant, Shani and Krishnan (1994)
Continuous Process Improvement, Customer Focus and Total Involvement or Universal Responsibility	Walsh, Hughes and Maddox (2002)
Degree of Leadership and Top Management Support and Commitment	Hendricks and Singhal (1997)
Comparison, Measurement and Best Practice Identification, Improvement and Implementation	Anand and Kodali (2008)
Benchmarking, Leadership, Top Management Support, Team Building and Problem Solving, Continuous Improvement, Supplier Quality and Relationship, Employee Empowerment, Organizational Culture, Use of Information Technology and Employee Involvement	Prajogo and Sohal (2004)
Leadership, Strategic Planning, Process Management, Resources Management and Results	Abu-Hamatteh et al. (2003)
Customer Focus, Process Management, Human Resources Management and Continuous Improvement	Isaksson (2006)
Management leadership and commitment, continuous improvement, customer-based approach, quality planning and management-based on facts,	Tarí (2005)
Employee Empowerment, Customer Satisfaction and Data Driven Policy Decision	Kannan and Tan (2005)
Requirement of the Customers, Continuous Improvement, Constant Result Measurement, Increased Employee Teamwork and Involvement, Team-based Problem Solving, Competitive Benchmarking, Good Intimacy with Supplier, Long-ranged Thinking and Work Reduction	Agus and Hassan (2011)
Quality Reporting and Data, Product and Service Design, Process Management and supplier quality management	Baird, Hu, and Reeve (2011)
Philosophy, Vision, Strategy, Aptitude, Resources, Rewards and Organization	Militaru, Ungureanu and Creţu (2013)
Quality Assurance	Abdous (2009)

Hypothesis development and formulation

Based on comprehensive literature review, the hypotheses of this study were formulated to achieve the research objectives. The process of the hypotheses development is discussed in the following sections.

TQM- Management leadership and sustainable performance

In the study of the relationship between TQM and performance, some researchers have emphasized that TQM as a single construct can be studied (Terziovski and Samson 1999). Other researchers such as Dow, Samson, and Ford (1999) reported that only some of the practices of TQM lead to positive relationship with sustainable performance (Yasin et al. 2004). According to Hendricks and Singhal (2001), the two mixed results showed that several TQM constructs have significant impacts on sustainable performance.

Many quality experts have argued that the key successful management of quality starts at the top management of the organization (Lakshman 2006). Management leadership is considered to be one of the prominent components of TQM strategy (Harrington and Williams 2004). Different dimensions of TQM are identified by many researchers (Ahire, Golhar, and Waller 1996). For instance, seven dimensions of TQM was identified by Sila and Ebrahimpour (2005) namely, human resources management, leadership, strategic planning, process management, customer focus, supplier management and information and analysis. The authors found that from all the factors, leadership and information analysis has the greatest effects. In the implementation of TQM, effective leadership can create strategies, mission statement and clear vision to support the mission (Yusuf, Gunasekaran, and Dan 2007). In addition, Oakland (2011) stated that strong leadership is required by the TQM and the improvement of overall sustainable performance is the greatest tangible advantage of excellence in leadership.

Furthermore, for developing and supporting organizational culture, the role of top management is very critical based on the effective training, participative decision making process, teamwork spirit and effective communication (Koehler and Pankowski 1996). The lack of top management and leadership commitment is considered as the main reason for 80% of TQM failure (Thiagarajan and Zairi 1997).

Summarily, past studies on TQM practices empirically analyzed the relationship between management leadership and sustainable performance (Arawati 2005; Valmohammadi 2011). Therefore, the hypothesis was proposed as follow:

Hypothesis 1a: TQM-Management Leadership has a significant and positive effect on Sustainable Performance

TQM-Benchmarking and sustainable performance

Some organizations used benchmarking strategy to make comparison among themselves on their performance to other leading and successful competitors in the market. It should be clearly understood that the basis of benchmarking practice is to analyze the products, services and techniques that are employed and produced by other competitors either within other industries or the same industry to achieve competitive advantages (Ahire, Golhar, and Waller 1996). Thus, in benchmarking practices, cost savings, process efficiency and customer and employee satisfaction are some criteria that can be applied.

The positive relationship between benchmarking and sustainable performance has been reported by few scholars (Arawati 2005; Fotopoulos et al. 2010). However, Dow, Samson, and Ford (1999) posited that some factors of TQM such as benchmarking advanced manufacturing technologies, closer supplier relationship and work teams do not contribute to quality results.

Based on the above-mentioned submission, the following hypothesis is to be empirically tested:

Hypothesis 1b: TQM-Benchmarking has a significant and positive effect on sustainable performance

TQM-continuous process improvement and sustainable performance

The main objective of TQM Practices is to satisfy customers through continuous process improvement at all levels of organization (Benavent, Ros, and Moreno-Luzon 2005). Every organization should develop continuous improvement practice to cover all types of organizational process which include management activities and styles (Benavent, Ros, and Moreno-Luzon 2005). Fundamentally, the expected end result of any organization is to achieve a high level of customers' satisfaction (Baker 2003).

Dean and Bowen (1994) added that, the drivers of continuous improvement are critical innovation and quality-conscious customers. There are many factors such as HRM, efficient information system and top management support in order to enhance and support continuous improvement practice in organization (Escrig-Tena 2004).

Some past studies showed positive effectiveness of continuous improvement of long-term productivity and competitive position of an organization (Yusuf, Gunasekaran, and Dan 2007) and business performance

(Fotopoulos et al. 2010; Lakshman 2006). Nevertheless, Burli, Kottursheettar, and Dalmia (2012) found that supplier management, management support and continuous improvement are not significantly affecting sustainable performance. Due to these contradictory results, the following hypothesis shall be empirically tested:

Hypothesis 1c: TQM-Continuous process improvement has a significant and positive effect on the sustainable performance

TQM-Service design and sustainable performance

Service design as one of the factors of TQM is more related to customer. By improving reputation and customer satisfaction, service design in organization positively contributes to the performance (Lakhe and Mohanty 1995). TQM of an organization can enhance the service performance in different dimension with good service design. Additionally, service design leads to process improvement in every organization that will reflect in reduction of cost of poor quality such as rework, scrap and late delivery. Therefore, when organization offers suitable service design, it can result to increased satisfaction of the customers, better work process and increase response time and subsequently increase profitability in business. All the participants of TQM are encouraged by TQM to involve in the design process to achieving optimal design in order to satisfy the requirement of the customers (Dewhurst, Martínez-Lorente, and Dale 1999). The study posits that before production and marketing, new service design have to be reviewed in order to clear requirements and satisfactions.

In TQM literature, it is reported that there is a strong relationship between service design and sustainable performance (Llorens Montes and Verdu Jover 2004): In relation to that, the following hypothesis to be empirically tested is proposed:

Hypothesis 1d: TQM-Service Design has a significant and positive effect on sustainable performance.

TQM-Human resources management and sustainable performance

Human resources management (HRM) is a practice under TQM strategy that comprises employees' involvement, employees' training and employees' empowerment (Ahire, Golhar, and Waller 1996). Employees should be motivated to participate in financial success, problem solving and decision-making of the organization (Yusuf, Gunasekaran, and Dan 2007). This implies that everyone is capable to participate in the organizational business and to know the present and future situation of the organizational financial success. Employees can participate through this knowledge more closely in the core business and involve in positively contributing to the sustainable performance of the organization.

Hence, all the employees in the organization are motivated by the TQM strategy in order to be closer to the goals and objectives of the organization (Collard 1989). In TQM strategy, HRM is an important factor. Therefore, TQM model that includes HRM should be designed by organizations to assist employees in accepting and successfully implementing TQM (Kekale and Kekale 1995). In addition, Akdere (2006) stated that through the support of employees, TQM practices positively related to organizational competitiveness.

An organizational culture change is needed for development and implementation of TQM practices in any organization to assist the employee in accepting and adopting TQM model. As the employees are the live asset of any organization, they are expected to add value to the organization if they get enough empowerment, involvement in teamwork and training and can be considered as the main successful drivers for implementation of TQM process.

Literature review of TQM showed that, there are numerous studies that stated that there is positive correlation between HRM and sustainable performance (Arawati 2005; Yasin et al. 2004). Therefore, considering the discussed literatures above, hypothesis was proposed for an empirical testing as follow:

Hypothesis 1e: TQM-HRM has a significant and positive effect on the sustainable performance.

TQM-Quality assurance and sustainable performance

TQM-quality assurance involves the concept of assessment procedures and systematic management used to achieve improved quality and quality outputs. Quality insurance based on clarification and comprehensive review is conceptualized around three sequential nonlinear stages namely: planning and analysis; design and prototype; production; and post-production and delivery (Abdous 2009). Toremen, Karakuş, and Yasan (2009) posited that in TQM, the responsibility for quality in found both in the team and in individuals through some developmental processes which stands for an approach to quality assurance to be more accordant with the fundamental ethics and structures of educational organization than many of the more hierarchical and mechanistic processes. Procedures for

quality assurance on goods and services have grown perpetually in accordance with the technological and socio-cultural changes that have marked the societal rapid evolution (Catalin, Bogdan, and Dimitrie 2014). Tran, Cahoon, and Chen (2011) explained that ISO was developed from Quality Assurance; Quality Assurance enabled the occurrence of quality management during the new-product development process and focused on continuous improvement as a key quality management practice.

In a few words, quality assurance is conceptualized in terms of systematic approach, a type of quality management practice that primarily involves in establishing organizational standards and procedures for quality (Cukier et al. 2012); a provided activity to all concerned, the proof required to establish confidence that the quality function is being performed properly (Lau and Tang 2009; Law 2010; Moldovan 2012; Seip, Frich, and Hoff 2012). Therefore, from the results of the previous studies, the following hypothesis was proposed:

Hypothesis 1f: TQM-quality assurance has a positive and significant impact on sustainable performance.

TQM-Information and analysis and sustainable performance

The information system is one of the crucial factors that positively contribute to the successful implementation of TQM (Ahire, Golhar, and Waller 1996). It is an integration of people, procedures, hardware and software (Kartha 2004). In this era of communication and information revolution, information and analysis is one of the key drivers of an effective performance (Saraph, Benson, and Schroeder 1989). Additionally, the authors posited that an organization can significantly react to rapid changes in a business environment if the organization has an appropriate information system. This is due to effective data collection, data presentation and data dissemination.

There are many researchers in the past literature that found a positive relationship between quality information system and sustainable performance (Ahire, Golhar, and Waller 1996; Sila and Ebrahimpour 2005). In contrast, Samson and Terziovski (1999) found that hard factors of TQM such as planning and process management and information and analysis are neither negatively related nor significantly related. In addition, Sila and Ebrahimpour (2005) found that information and analysis has indirect effect only on business outcomes. In other vein, information and communication does not have any significant impact on the market orientation as Samat, Ramayah, and Saad (2006) examined the association between TQM and market orientation. As a result of discrepancy in the previous studies, the following hypothesis was proposed:

Hypothesis 1g: TQM-Information and Analysis has a significant and positive impact on sustainable performance.

Environmental regulation and policy and sustainable performance

Only a few researchers have studied the relationship between ERP and OP despite the global view of the impact that environmental rules and regulation can have on an organization; thereby determining its performance (Aigner and Lloret 2013). The perception on the possible effect of ERP on sustainable performance is derived from the ability of ERP to create proactive environmental system (Bracci and Maran 2013). This has made ERP to be identified as strategic resources in the design and application of organizational strategies. Dam and Petkova (2014) equally posited that ERP is related to performance directly. Thus, establishing all these effects of ERP on sustainable performance makes it incomplete to study sustainable performance through TQM without considering ERP in this information and communication era.

In addition, Gadenne et al. (2012) investigated the effect of sustainability performance management practice on organizational sustainability performance in organizations in Australia. Using a mailed printed questionnaires to obtain data from 314 medium to large organizations and personal interview with 20 senior executives, the findings revealed that eight sustainability performance management practices (SPMP) was applied by organizations to enhance seven different sustainability performance indicators (SPIs) namely information capital performance, employee value, financial performance, new product development, customer value, environmental and social responsibility.

Therefore, from the results of the previous studies, the following hypothesis was proposed:

Hypothesis 2: Environmental Regulation and Policy has a positive and significant impact on sustainable performance.

Organizational excellence and sustainable performance

The most important measurement indicators for any organization's advancement, competitiveness, success, development and achievement are organizational excellence and sustainable performance. While every one of the leads to another, yet they are still

interrelated; however, achieving organizational excellence as a practice that comprises innovation leads to sustainable performance. The EFQM states that organization with performance of 60 per cent and above is considered as excellence organization. According to Antony and Bhattacharyya (2010), the existing models of excellence consider excellence as an outstanding level of performance. How organization can achieve and sustain competitive advantages and how they can pursue business excellence in the field of business performance are the basic questions (Dahlgaard and Dahlgaard-Park 2006; Watson 2003).

Due to this, Harrington (2005) reported that organizational excellence is a holistic approach that enhances sustainable performance. Furthermore, organizational excellence has a significant relationship with business performance (Ooncharoen and Ussahawanitchakit 2008). Additionally, Pinar and Girard (2008) made an empirical study on 200 Turkish firms and found that there is significant relationship between organizational excellence and performance. Thus, the following hypothesis was proposed based on the previous discussion:

Hypothesis 3: Organizational Excellence has a significant and positive impact on sustainable performance.

Organizational excellence as a mediator between total quality management (TQM) practices and sustainable performance

Generally, excellence when linked to TQM implementation takes different shape in several aspects such as leadership management and coherence with objectives, continuous improvement in terms of facts and processes, orientation to customers and results, learning and public responsibility, innovation and development of partnership (Mele and Colurcio 2006). It is argued that excellent position is achieved by an organization when it is capable of leading to sustainable performance and the optimum value with respect to competitors.

In addition, organizational excellence is a key stage on the journey of quality practices (McAdam 2000). From the history, the word excellence is still unclear until 1982 when Peters and Waterman published a book on it (Kanji and Sá 2007). The authors reported that excellence directly became related to levels of performance. Furthermore, in the results from their literature review on TQM implementation elements for manufacturing excellence, Sharma and Kodali (2008) developed a model for implementing sustainable manufacturing excellence from comparative analysis of other TQM models. The goal of an organization is not to have TQM practices only in itself but to adopt it as a managerial approach through excellence in the achievement of sustainable performance (McAdam, Armstrong, and Kelly 1998). Therefore, the following hypothesis was proposed:

Hypothesis 4: Organizational Excellence mediates the relationship between TQM practices and sustainable performance

Environmental regulation and policy as a moderator between total quality management (TQM) practices and sustainable performance (SP)

Undoubtedly, both TQM and ERP have attracted the attention of people both in business and academic environment (Ahmad and Schroeder 2002; Besseris 2012). Such popularity can be referred back to the unprecedented high number of published articles in both fields in an attempt of the scholar in the fields to validate its theories and concepts. In addition, the success gained through implementation so far by TQM makes it to be more renowned. This has led to a pronouncement of TQM practices as an organization's critical success indicators in technology-driven society of today. This has also opened a significant number of opportunities for environmentalists such as environment managers and sustainable environment building teams in many organizations.

Therefore, ERP can be considered as one of the critical factors of organization; thus, one can infer that TQM can be best achieved through effective ERP which eventually lead to a sustainable performance. In view of this fact, this study is interested in examining how integration of ERP with TQM will enhance sustainable performance. Hence, the hypothesis is stated as:

Hypothesis 5: Environmental Regulation and Policy moderates the relationship between TQM practices and sustainable performance

Therefore, framework of this study is developed according to the past studies as reviewed above on managerial and theoretical issues. The Figure 1 presents the proposed model based on the above-mentioned constructs.

A well-defined gap was found between variables that support more investigation on the relationship between the proposed variables. The examination of the joint impact of TQM, ERP and organizational excellence on sustainable performance is lacking in the literature. The roles of organizational excellence have been neglected unlike sustainable performance. The interaction between sustainable performance and organizational excellence is not clearly defined and limited in the studies (Pinar and Girard 2008). This

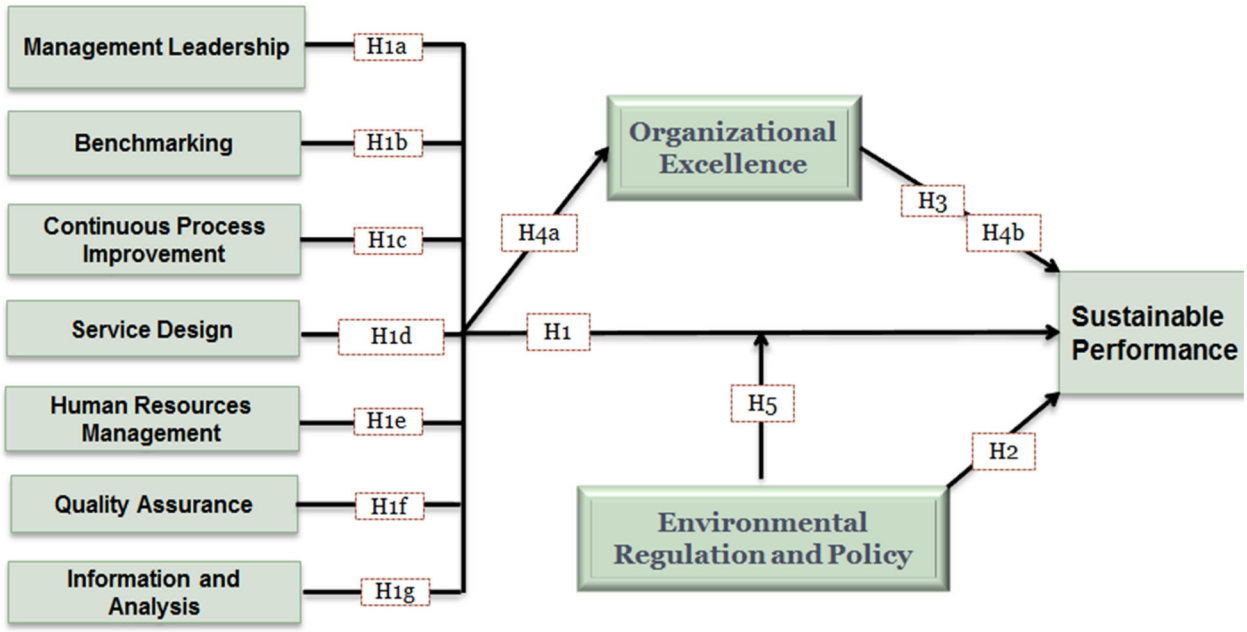

Figure 1. conceptual research model linking quality practices: management leadership, benchmarking, continuous process improvement, service design, human resources management, quality assurance and information and analysis and organizational excellence, environmental regulation and policy and sustainable performance.

result unfolds a loophole that should be filled in this study. Furthermore, there is still lack of study on organizational excellence and sustainable performance and their relationship; some of the studies found significant and positive relationship between the variables (Antony and Bhattacharyya 2010; Ooncharoen and Ussahawanitchakit 2008; Pinar and Girard 2008).

Thus, the study conducted by Pinar and Girard (2008) is used in formulating the study's framework by using organizational excellence as a mediator. A mediator shows the occurrence of a given effect. Additionally, the independent variable causes the mediator which then leads to the result (Shadish and Sweeney 1991). As stated earlier, TQM is responsible for organizational excellence while organizational excellence leads to sustainable performance. In this continuous changing environment, organizations need a powerful system that can incorporate their process with other or within their boundaries. As stated by some researchers, ERP is considered a significant innovative (Jha and Joshi 2007). However, ERP can improve sustainability performance and add values to organizations (Davenport and Brooks 2004; Kamhawi 2008; Kale, Banwiat & Laroiya, 2010), it can also affect the performance negatively (Hunton, Lippincott, and Reck 2003; Velcu 2007; Wieder et al. 2006). These inconsistencies and inconclusiveness due to some critical success factors represent a research gap that needs further investigation.

There is another gap found in the association between TQM and sustainable performance. Previous studies showed that there is a positive and significant impact of TQM on sustainable performance (Talib, Rahman, and Qureshi 2013; Wang, Chen and Chen 2012; Zehir et al. 2012). However, some other studies do not find the relationship significant (Davis 1997; Kober, Subraamanniam, and Watson 2012; Westphal, Gulati, and Shortell 1996). These inconsistencies of results create a research gap that should be further investigated by introducing new variable that may explain the relationship in a better way. For this purpose to be achieved in this study, organizational excellence was proposed to mediate the association between TQM and sustainable performance.

From the above hypothesis development, the scholarly foundation for this study is presented by providing a comprehensive review of literature. From the past studies reviewed, the construct conceptualization involved: TQM, sustainable performance and environmental regulation and policy and organizational excellence are done. This section exclusively presents the relationship and interconnectivity between the variables. In reference to that, the research framework to be validated by this study is presented.

Methodology

This research is categorized under the correlational research as it is in accordance with testing of the

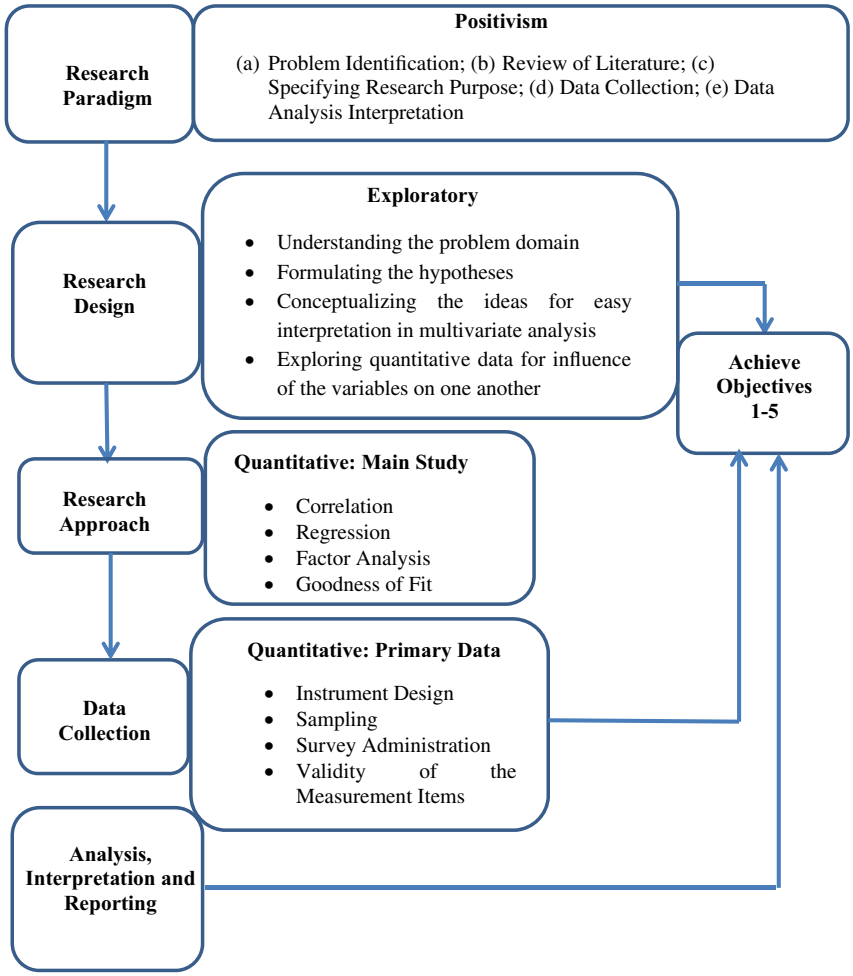

Figure 2. Research methodological framework.

formulated research hypotheses (Creswell 2009). The approach to the research is post-positivism (as shown in Figure 2) which is regarded as a research pattern performed with research activities from problem identification, literature review, and specification of research purpose, collection of data, data analysis, interpretation and report of data (John and Ngoasong 2008). The approach of this study is quantitative which is adopted most in social sciences (Sekaran and Bougie 2016). In collecting the data of the study, post mails were used to send the questionnaires. The questionnaire was produced in English Language. A number of 303 questionnaires have been distributed and 168 have been returned representing 55.45% as a response rate.

Instrument design

A survey questionnaire is employed in this study as the data collection instrument. The items of the questionnaires were designed carefully with simplicity to clearly reflect the dimensions used to measure the constructs of the model. Notably, the questionnaire items were designed in accordance with the conceptual explanation in the literature and are either adopted or adapted. The justification can be traced to the work of Zikmund et al. (2010). Items for measuring quality practices: management leadership, benchmarking, continuous process improvement, service design, human resources management, quality assurance and information and analysis and organizational excellence, environmental regulation and policy and sustainable performance form the parts of the questionnaire. Relevant literatures are used as guides for the development of the survey instrument. Similarly, supporting literature is adequately cited in cases where the items are newly developed i.e., where primary data collection method had not been used previously.

Sample of the study

This study draws its sample from the accessible population to be used using simple random technique. Based on this foundation, the target population for this study is all food and beverage companies in Malaysia which is a subset of agro-based industry. A

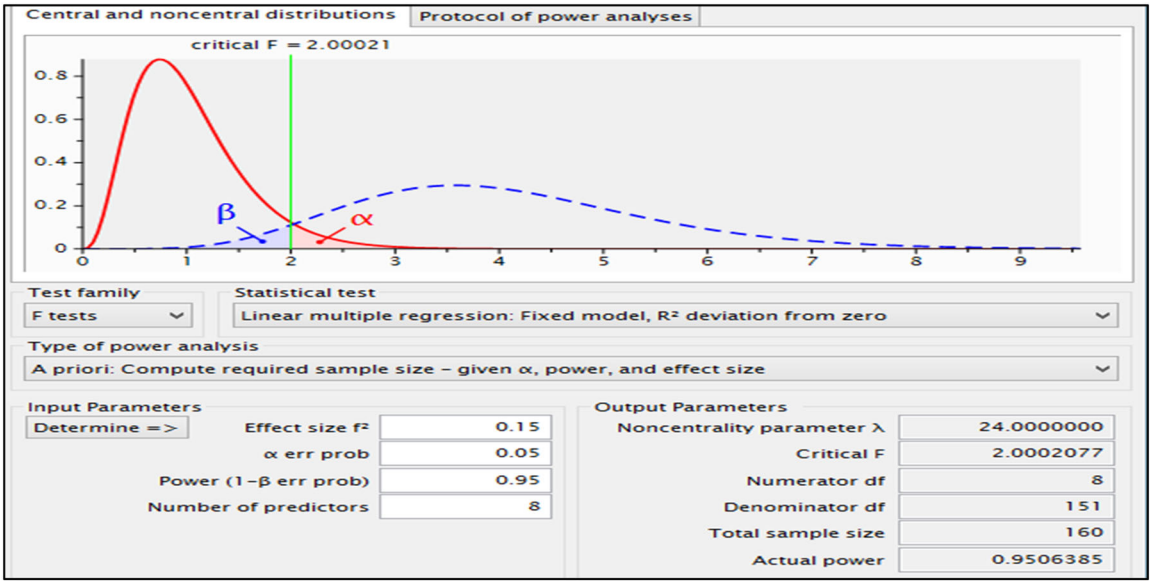

Figure 3. Total sample size using g-power analysis.

total number of 420 companies are gotten from food and beverage Federation of Malaysian Manufacturers in joint collaboration with Malaysia External Trade Development Corporation directory (FMM-MATRADE Industry Directory, Food & Beverage, 2015). Since this study is employing PLS-SEM as the analysis technique, the sample size is gotten from G-power analysis. Therefore, the minimum sample size for a model is based on the maximum number of arrows pointed at any latent variable in the model using the G*Power technique. The research model shows the conceptual model of this research where management leadership, benchmarking, quality assurance, continuous process improvement, human resources management, service design and quality and information and analysis and organizational excellence make eight arrows towards sustainable performance being the latent variable and the variable which carried highest number of arrows. Therefore, the total sample size suitable for the data analysis of this study is 160 as shown in the Figure 3 below.

The questionnaire structure

Using questionnaires in survey researches is as important as structuring the questionnaire (Organ, Podsakoff, and MacKenzie 2006). Perhaps, this is true as there are a lot of challenges that may adversely tamper the validity of the data and the rate of responses (Hair et al. 2007). In order to get rid of those challenges, this study followed the suggestions by Organ, Podsakoff, and MacKenzie (2006) and Gupta (2006) and took different precautions such as abiding by the research ethics of protecting the respondent's identity, appropriate and unambiguous scaling of items and separating items according to constructs.

Scale of the questionnaire

In this study, the selection of an odd scale particularly the 5-point scale is appropriate because it will increase the reliability of the data as well as lessen social desirability bias as proven by Krosnick (1999). Respondents were tasked to give response to each item using 5-likert scale to showing their agreement level. In addition, 5-point Likert Scale is used as it can make compromise between the contradictory goals of offering enough option since only two or three options indicates measuring direction only rather than measuring the strengths of opinion and making things manageable for the respondents. And lastly, most previous studies highly recommended the Likert scale (Dawes 2008; Pearse 2011).

Why PLS SEM 3?

The objective of this study is to examine the relationship between the latent variables. Therefore, the technique of latent analysis is considered to be the most suitable method. There was an option to use AMOS being a covariance-based SEM technique but the data must be normal distribution (Hair et al. 2010). The assumptions have been previously tested in SPSS before choosing the technique of the analysis. Researchers' arguments for choosing PLS for testing the structural equation models as statistical means are as follow (Urbach and Ahlemann 2010):

Table 2. Sustainable performance coding.

Item During the last three years, our organization has achieved …	Code
Economic sustainability performance	
Decrease in cost of material purchasing	SP01
Decrease in cost of energy consumption	SP02
Environmental sustainability performance	
Reduction in air emission as a result of the activities in the manufacturing company	SP03
Reduction in waste water as a result of the activities in the manufacturing company	SP04
Social sustainability performance	
Improvement of employees' health and safety resulting from green practices	SP05
Engagement and incentive for local employment	SP06

Source: Adopted from Brent' and Labuscgane' (2004)

1. Regarding sample size, PLS makes fewer demands than other methods;
2. PLS can handle both formative and reflective constructs;
3. PLS does not necessarily require input data that are normally distributed;
4. PLS is specially good for prediction; and lastly
5. PLS with a large number of constructs can be applied to complex structural equation modeling.

The measuring items and their coding

Sustainable performance dimension

The Sustainable performance construct is measured using economic, environmental and social performance. In total, six (6) items are adopted from the study of Brent' and Labuschagne' (2004). In order to absolutely embrace the idea of sustainability, these three measurements or dimensions of sustainable performance are critical to paddle a business successfully for now and the nearest future as supported by Dunphy (2011) and Eweje (2011). To designate the assessment period, the last three years of the organization activities are used. The items used in measuring the sustainable performance and their respective codes are shown in Table 2:

TQM practices dimension

The previous chapter discussed the critical elements that affect the successfulness of TQM. During the analysis of the CSFs of critical success factors of TQM, it is revealed that many researchers made an attempt to identify variables that constitute TQM like: Brah, Tee, and Rao (2002); Fotopoulos and Psomas (2010); and Yusuf, Gunasekaran, and Dan (2007). There are some commonalities among them when analyzing these dimensions such as continuous process improvement and management leadership. From the work done by previous scholars, seven variables have been selected: leadership management, quality assurance, service design, human resources management, continuous process improvement, benchmarking and information and analysis to measure the efficiency of quality practices on sustainable performance in manufacturing firms.

To measure management leadership, human resources management, service design and benchmarking constructs, Brah et al. (2002) will be used. It is noteworthy that the coefficient alphas for all construct should not be less than 0.70 cutoff requirements as opined by Kaiser (1974). Information and analysis construct has been adapted from measurement used by Anderson and Sohal (1999). In their study, Information and analysis tried to clarify how the business evaluate the data collected, analyzed and used for effective and efficient work for increasing improvements. Their questionnaire based on the Australian Quality Awards Framework (AQA). Continuous improvement construct has been adapted from measurement used by Rao (2006) as presented below. The explanations of Abdous (2009) given on the concept of quality assurance was adopted and modified into 6-item construct description. This study categorizes quality assurance to planning, process focus and production and delivery, with total of 6-item. Table 3 exhibited the items used to measure TQM practices.

Environmental regulation and policy dimension

The environmental regulation and policy construct is measured to designing the totality of 6-item construct. The items are adapted from the study of Daily and Huang (2001). The items used in measuring the competitive advantage and the coding are presented in the Table 4.

Organizational excellence dimensions

Organizational excellence is used as independent variables using three key factors of organizational excellence of high performance according to Darling and Nurmi (1995) and Pinar and Girard (2008): constant innovation, committed people and customer focus. For the purpose of this study, some suitable items are adopted i.e., to investigate organizational excellence as a mediator between TQM, ERP and sustainable performance. All dimensions of the original measure are all covered by those items adapted from Pinar and Girard (2008) as presented in Table 5.

Table 3. Total quality management practices coding.

Author(s)	Item	Code
Management Leadership		
Brah et al. (2002)	In our organization, the top management has long-term quality plans.	ML1
	In our organization, the top management has set up clear quality goals.	ML2
	In our regular meeting, the top management always emphasizes the importance of service quality delivered to our customers.	ML3
	In our organization, the top management encourages us to view service quality as being important more than us.	ML4
	In our organization, the top management often involves in quality training	ML5
Human Resources Management		
Brah et al. (2002)	In our organization, all the suggestions of employees are evaluated.	HRM1
	In our organization, we always work in team with the members of various department	HRM2
	In our organization, we use teamwork ability as a criterion in selecting employees	HRM3
	In our organization, employees' training is provided with quality principles	HRM4
Quality Assurance		
Abdous (2009)	In our organization, the leadership provides sufficient internal communication facilities for effective planning	QA1
	In our organization, employees ensures using the best planning and learning method for achieving quality	QA2
	Our organization encourages innovative plan to achieve best practice	QA3
	Our organization has a collective way of planning	QA4
	Our organization considers quality planning as a top priority in the regular meeting	QA5
	The process of production is designed in a way that it adds value to our products	QA6
Service Design		
Brah et al. (2002)	It is our organizational policy to review thoroughly the new service design before its marketing	SD1
	The new service quality in our organization is more important than cost reduction	SD2
	Employees from different organization often participate when designing new service	SD3
	The organization has commitment to review the traditional technique to meet the present standard	SD4
	Newly introduced processes are critically examined prior to its actual implementation	SD5
Information and Analysis		
Anderson and Sohal (1999)	In our organization, we have programs in place to minimize the period receiving an order and its satisfaction	IA1
	In our organization, data of performance is collected and analyzed in regular basis	IA2
	In our organization, information enables us to improve and control the core services and processes	IA3
	In our organization, timely information is received and the important data is communicated and presented to employees in regular basis	IA4
Benchmarking		
Brah et al. (2002)	In our organization, it is always emphasized that benchmarking is our strategy to achieve a better competitive position	BM1
	We pay visit to other companies , internationally and locally to examine their practices	BM2
	In our company, we conduct research to find out the best practices of other international and local policies.	BM3
	Our organization have a way of identifying a benchmarking subject	BM4
	Our organization has a collective way of identifying partners	BM5
	Our organization determines current competitive gap among other companies	BM6
	Our organization identifies the critical success factors or indicators to be benchmarked	BM7
	Our organization projects future performance	BM8
	Our organization develops action plans after comparison	BM9
Continuous Process Improvement		
Rao (2006)	In our company, there is always an emphasis in all levels of various activities on continuous improvement	CPI1
	In our company, continuous improvement is emphasized to the employees in the training programs provided	CPI2
	In the policies of our company, improving the quality is more important than the quantity or short term goals	CPI3
	In our company, all stations and development believe that, they can serve better and survive in a highly competitive environment by implementing continuous improvement.	CPI4

Table 4. Environmental regulation and policy coding.

Authors	Items	Code
Daily and Huang (2001)	Environmental Regulations and Policy	
	This organization ensures public health in every aspect through all the obstructions such as private and public nuisance and emission of air pollution	ERP01
	Our organization establishes free environment for all the customers	ERP02
	Our organization enforces constitutional law relating to environmental obligation	ERP03
	Our organization keeps human habitation free from pollution	ERP04
	Our organization establish environmental balance for keeping nature and natural beauties	ERP05
	Our organization has enforcement of human right to pollution-free environment under constitutional obligation for its employees	ERP06

Table 5. Organizational excellence coding.

Author(s)	Item	Code
Pinar and Girard (2008)	Customer care is a top priority in our company	OE1
	Services with customers in mind are developed by our company	OE2
	Our employees are duly committed to our company	OE3
	The most valuable asset of our company are our employees	OE4

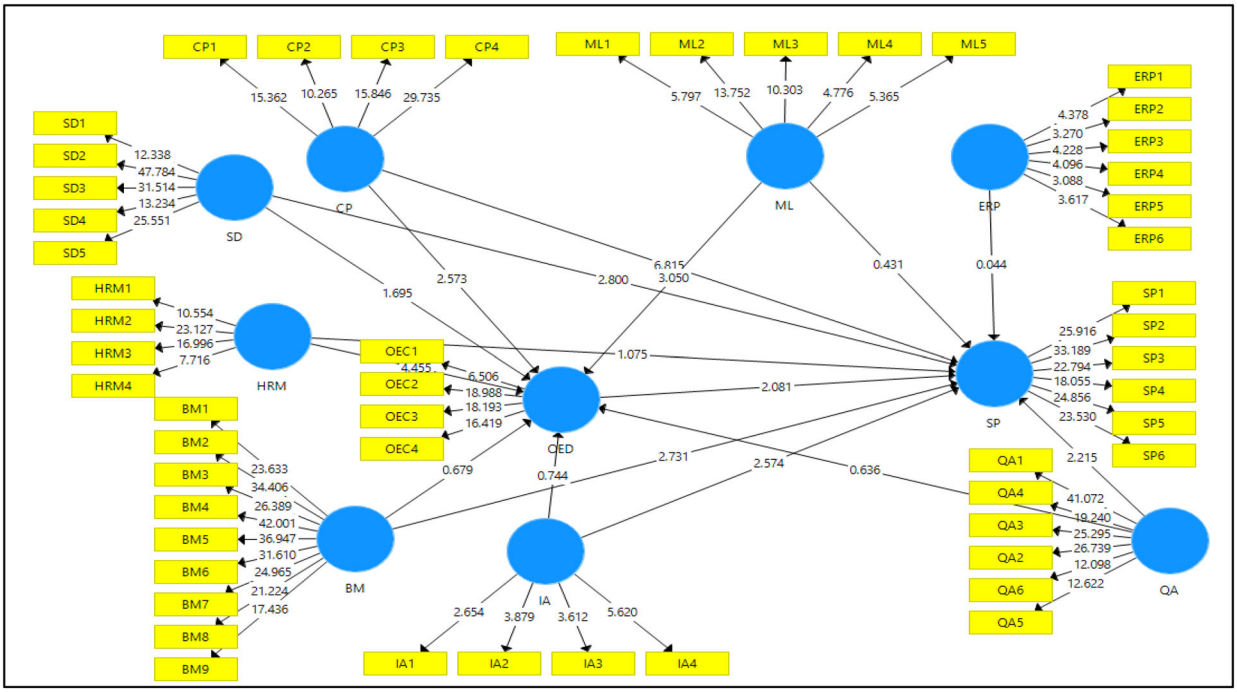

Figure 4. The research model.
Note: Management Leadership (ML), Service Design (SD), Human Resources Management (HRM), Benchmarking (BM), Continuous Process Improvement (CP), Quality Assurance (QA), Information and Analysis (IA), Organizational Excellence (OEC), Environmental Regulation and Policy (ERP), Sustainable Performance (SP)

Preliminary analysis of data and result

The goodness of the measures of this study was examined to identify the factors underlying the variables and utilized the PLS-SEM using Smart PLS 3.0 set up the construct validity of the measures which shall be discussed in the following sections. The outer model of the measurement model was assessed through the techniques of PLS-SEM before testing the hypotheses of the study. This study employed the method suggested by Anderson and Gerbing (1988) in order to achieve the objective. The model of this study is shown in the Figure 4 with their structural dimensions.

Construct validity

According to Hair et al. (2010), the construct can be examined through discriminant validity, content validity and convergent validity.

The content validity

The degree at which the proposed items to a constructs to be measured can measure suitably the concept that is designed to be measured is called content validity (Hair et al. 2010). In other word, items that are designed for a construct to be measured should be highly loaded respectively than their loadings on other constructs. Therefore, through deep-depth review of the past studies in literature review, this can be insured on how items were generated. According to the factor analysis concept, all items are assigned to their respective constructs (Adeleke, Bahaudin, and Kamaruddeen 2015). Table 6 shows the content validity of the measure used as explained in two manners. Firstly, there are high loadings in the items of their respective constructs when compared with other constructs. Secondly as posited by Chow and Chan (2008), items' loading are loading significantly on their respective constructs indicating the content validity of the measure adopted in this study.

The analysis of the convergent validity

The convergent validity is the degree at which a group of variables converge in measuring a particular concept (Hair et al. 2010). In addition, the authors added that three criteria should be concurrently tested in establishing the convergent validity namely: the factor loading; the composite reliability (CR); and the average variance extracted (AVE). Thus, when all items are having loadings with values more than 0.5, the loadings of all items were examined which is an acceptable level by following the literature of multivariate. At the 0.01 level of significant, all the factor loadings are significant as shown in Table 7. The second criterion for convergent validity is the

Table 6. Factor analysis and loading of the items loadings.

	BM	CP	ERP	HRM	IA	ML	OED	QA	SD	SP
z	**0.769**	0.529	0.085	0.420	−0.048	0.041	0.305	0.233	0.361	0.506
BM2	**0.841**	0.523	0.142	0.417	−0.133	0.063	0.319	0.250	0.335	0.474
BM3	**0.819**	0.460	0.180	0.395	−0.014	0.086	0.326	0.233	0.324	0.498
BM4	**0.868**	0.518	0.177	0.294	−0.045	0.102	0.267	0.213	0.329	0.500
BM5	**0.858**	0.489	0.227	0.359	−0.021	0.137	0.202	0.230	0.359	0.500
BM6	**0.812**	0.464	0.150	0.332	−0.048	0.071	0.269	0.191	0.313	0.441
BM7	**0.808**	0.506	0.112	0.406	−0.048	0.112	0.207	0.294	0.270	0.422
BM8	**0.759**	0.463	0.244	0.356	0.025	0.108	0.177	0.320	0.322	0.491
BM9	**0.719**	0.413	0.276	0.332	−0.046	0.043	0.186	0.317	0.352	0.505
CP1	0.408	**0.737**	0.049	0.396	0.108	0.020	0.234	0.230	0.238	0.491
CP2	0.420	**0.677**	0.272	0.321	0.027	0.110	0.270	0.234	0.169	0.436
CP3	0.431	**0.756**	0.127	0.221	0.064	−0.004	0.321	0.157	0.163	0.460
CP4	0.510	**0.793**	0.171	0.467	0.098	0.006	0.377	0.306	0.359	0.740
ERP1	0.122	0.157	**0.763**	0.161	−0.025	0.195	0.103	0.097	0.095	0.146
ERP2	0.188	0.051	**0.681**	0.115	−0.087	0.129	0.044	0.052	0.109	0.061
ERP3	0.211	0.163	**0.792**	0.101	−0.072	0.191	0.013	0.075	0.129	0.100
ERP4	0.154	0.150	**0.792**	0.060	0.006	0.114	−0.069	0.025	0.044	0.086
ERP5	0.077	0.057	**0.596**	−0.036	−0.087	0.052	−0.038	−0.061	0.001	0.077
ERP6	0.174	0.196	**0.643**	0.068	0.251	0.096	0.038	0.057	0.182	0.192
HRM1	0.358	0.608	0.197	**0.640**	0.024	0.015	0.342	0.326	0.334	0.578
HRM2	0.351	0.229	0.049	**0.820**	−0.021	0.092	0.458	0.293	0.386	0.294
HRM3	0.364	0.283	0.033	**0.805**	−0.017	0.124	0.360	0.185	0.239	0.317
HRM4	0.208	0.158	0.008	**0.655**	0.000	0.094	0.240	0.150	0.197	0.212
IA1	−0.030	0.079	−0.036	0.090	**0.619**	−0.047	−0.006	−0.007	0.058	0.092
IA2	−0.072	−0.019	0.124	−0.089	**0.740**	0.000	−0.095	−0.102	−0.077	0.053
IA3	−0.064	0.111	0.072	−0.007	**0.716**	−0.032	−0.052	−0.113	−0.153	0.128
IA4	−0.004	0.100	0.011	−0.002	**0.856**	−0.121	−0.035	−0.087	−0.107	0.148
ML1	0.117	−0.013	0.126	0.095	0.042	**0.698**	0.134	−0.075	0.066	0.038
ML2	0.136	0.097	0.208	0.166	−0.074	**0.862**	0.303	0.062	0.040	0.054
ML3	0.055	0.032	0.070	0.041	−0.116	**0.843**	0.204	0.040	−0.037	0.049
ML4	−0.024	−0.042	0.029	−0.007	0.020	**0.666**	0.072	0.008	−0.054	−0.008
ML5	0.018	−0.039	0.194	−0.019	−0.088	**0.641**	0.151	−0.097	0.090	0.000
OEC1	0.379	0.608	0.104	0.386	0.001	0.009	**0.637**	0.283	0.243	0.591
OEC2	0.223	0.218	−0.002	0.381	−0.051	0.253	**0.837**	0.098	0.222	0.270
OEC3	0.161	0.157	−0.008	0.348	−0.106	0.357	**0.860**	0.077	0.297	0.198
OEC4	0.140	0.154	−0.016	0.413	−0.058	0.313	**0.834**	0.061	0.240	0.202
QA1	0.230	0.254	0.103	0.282	−0.099	0.021	0.182	**0.878**	0.272	0.344
QA2	0.279	0.346	0.034	0.325	−0.112	0.015	0.191	**0.847**	0.281	0.317
QA3	0.181	0.220	0.077	0.315	−0.013	0.015	0.179	**0.838**	0.224	0.320
QA4	0.239	0.222	0.010	0.261	−0.064	−0.066	0.177	**0.809**	0.354	0.295
QA5	0.295	0.214	0.105	0.182	−0.065	0.026	−0.087	**0.695**	0.375	0.292
QA6	0.293	0.261	0.021	0.268	−0.167	0.015	0.179	**0.671**	0.354	0.303
SD1	0.356	0.328	0.249	0.209	−0.075	0.014	0.063	0.207	**0.717**	0.337
SD2	0.366	0.326	0.134	0.433	−0.028	0.053	0.389	0.373	**0.869**	0.427
SD3	0.298	0.288	0.058	0.349	−0.027	−0.037	0.320	0.322	**0.844**	0.407
SD4	0.231	0.099	0.161	0.222	−0.173	0.049	0.075	0.241	**0.735**	0.232
SD5	0.374	0.222	0.086	0.353	−0.222	0.073	0.267	0.326	**0.819**	0.342
SP1	0.475	0.633	0.129	0.468	0.129	−0.002	0.373	0.377	0.378	**0.807**
SP2	0.443	0.638	0.067	0.448	0.187	0.010	0.380	0.425	0.371	**0.839**
SP3	0.372	0.578	0.173	0.441	0.031	0.079	0.471	0.327	0.337	**0.788**
SP4	0.557	0.605	0.255	0.352	0.129	0.032	0.265	0.256	0.369	**0.790**
SP5	0.468	0.570	0.143	0.412	0.186	0.047	0.353	0.254	0.390	**0.819**
SP6	0.578	0.559	0.116	0.382	0.060	0.067	0.317	0.240	0.333	**0.770**

Note: *Management Leadership (ML), Service Design (SD), Human Resources Management (HRM), Benchmarking (BM), Continuous Process Improvement (CP), Quality Assurance (QA), Information and Analysis (IA), Organizational Excellence (OEC), Environmental Regulation and Policy (ERP), Sustainable Performance (SP)*

composite reliability. The composite reliability (CR) is the degree at which a set of items consistently show the latent constructs (Hair et al. 2010). The Table 7 also presents the values of composite reliability and Cronbach's alpha. The value of the CR ranged from 0.822 to 0.922 while that of Cronbach's alpha is within 0.722 and 0.933 which exceed 0.7 which is the recommended value (Fornell and Larcker 1981). The convergent validity of the outer model is confirmed and affirmed by these results.

Therefore, the values of the AVE were examined in order to validate the convergence of the outer model. The AVE among a group of items is examined by the AVE among the group of items in relation to the variance shared with errors from measurements. Moreover, the variance covered by indicators is measured by the AVE in relation to the variance assigned to the measurement error. Therefore, these sets of items have adequate convergence to measure the concerned construct when the value is at least 0.5

Table 7. The convergent validity analysis.

Constructs	Items	Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Benchmarking	BM1	**0.769**	0.933	0.944	0.651
	BM2	**0.841**			
	BM3	**0.819**			
	BM4	**0.868**			
	BM5	**0.858**			
	BM6	**0.812**			
	BM7	**0.808**			
	BM8	**0.759**			
	BM9	**0.719**			
Continuous Process Improvement	CP1	**0.737**	0.733	0.830	0.550
	CP2	**0.677**			
	CP3	**0.756**			
	CP4	**0.793**			
Environmental Regulation and Policy	ERP1	**0.763**	0.822	0.861	0.512
	ERP2	**0.681**			
	ERP3	**0.792**			
	ERP4	**0.792**			
	ERP5	**0.596**			
	ERP6	**0.643**			
Human Resources Management	HRM1	**0.640**	0.722	0.822	0.539
	HRM2	**0.820**			
	HRM3	**0.805**			
	HRM4	**0.655**			
Information and Analysis	IA1	**0.619**	0.723	0.825	0.544
	IA2	**0.740**			
	IA3	**0.716**			
	IA4	**0.856**			
Management Leadership	ML1	**0.698**	0.812	0.862	0.559
	ML2	**0.862**			
	ML3	**0.843**			
	ML4	**0.666**			
	ML5	**0.641**			
Organizational Excellence	OEC1	**0.637**	0.810	0.873	0.635
	OEC2	**0.837**			
	OEC3	**0.860**			
	OEC4	**0.834**			
Quality Assurance	QA1	**0.878**	0.881	0.910	0.630
	QA2	**0.847**			
	QA3	**0.838**			
	QA4	**0.809**			
	QA5	**0.695**			
	QA6	**0.671**			
Service Design	SD1	**0.717**	0.863	0.898	0.639
	SD2	**0.869**			
	SD3	**0.844**			
	SD4	**0.735**			
	SD5	**0.819**			
Sustainable Performance	SP1	**0.807**	0.889	0.916	0.644
	SP2	**0.839**			
	SP3	**0.788**			
	SP4	**0.790**			
	SP5	**0.819**			
	SP6	**0.770**			

Note: *Management Leadership (ML), Service Design (SD), Human Resources Management (HRM), Benchmarking (BM), Continuous Process Improvement (CP), Quality Assurance (QA), Information and Analysis (IA), Organizational Excellence (OEC), Environmental Regulation and Policy (ERP), Sustainable Performance (SP)*

(Barclay, Higgins, and Thompson 1995). The value of AVE ranges from 0.512 to 0.659 in this study. According to Barclay, Higgins, and Thompson (1995), the result indicates a reliable level of construct validity of the measures employed.

The analysis of the discriminant validity

The discriminant validity is necessary to be established in order to affirm the construct validity of the outer model. Therefore, the test of discriminant validity is needful before testing for the hypothesis of the path analysis. Thus, the discriminant validity reveals that there is no overlapping in the item using different construct. In the same vein, the discriminant validity of the measures between each constructs shared variance; thus, Compeau, Higgins, and Huff (1999) mentioned it should be greater than the variance shared among the distinct construct. In this study, the

Table 8. The Discriminant Matrix (**Latent Variable Correlation**).

	BM	CP	ERP	HRM	IA	ML	OED	QA	SD	SP
BM	**0.807**									
CP	0.602	**0.742**								
ERP	0.219	0.207	**0.715**							
HRM	0.457	0.487	0.120	**0.734**						
IA	−0.053	0.103	0.055	−0.002	**0.737**					
ML	0.104	0.038	0.187	0.102	−0.078	**0.748**				
OEC	0.314	0.415	0.037	0.494	−0.061	0.268	**0.797**			
QA	0.313	0.321	0.071	0.349	−0.110	0.005	0.190	**0.794**		
SD	0.410	0.331	0.154	0.414	−0.113	0.035	0.322	0.381	**0.799**	
SP	0.600	0.452	0.182	0.520	0.152	0.046	0.448	0.393	0.453	**0.803**

Note: *Management Leadership (ML), Service Design (SD), Human Resources Management (HRM), Benchmarking (BM), Continuous Process Improvement (CP), Quality Assurance (QA), Information and Analysis (IA), Organizational Excellence (OEC), Environmental Regulation and Policy (ERP), Sustainable Performance (SP)*

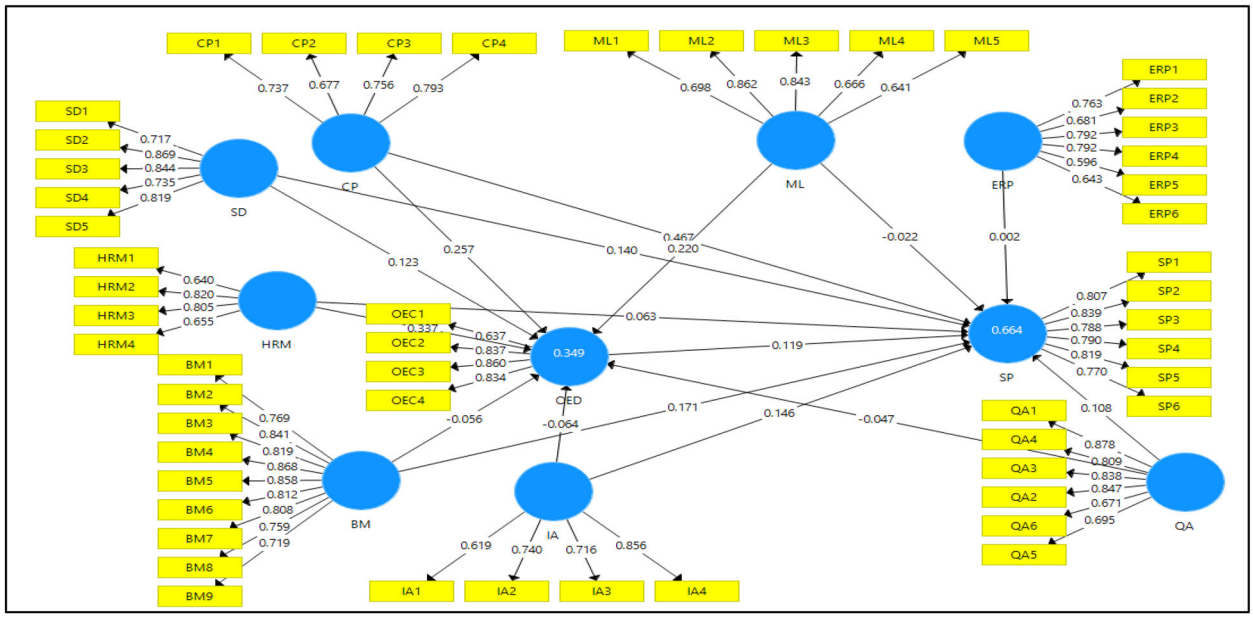

Figure 5. Path model significance results.

method described by Fornell and Larcker (1981) is used to ascertain the discriminant validity of the measures. The Table 8 illustrates how the AVE's square root was replaced at the diagonal elements of the correlation matrix for all constructs. Therefore, the confirmation of the discriminant validity of the outer model of this study is indicated where the diagonal elements in the table are higher than the other elements of the column and the row where they are located. It is then concluded that, the obtained results regarding the hypothesis test should be highly reliable and valid for the test of the construct validity of the outer model.

The assessment of the inner model and hypotheses testing procedures

When the goodness of the outer model has been confirmed, the next thing was to test the hypothesized relationships among the variables. Through the running of PLS Algorithm using Smart PLS, the hypothesized model was tested. Therefore, the path coefficients were generated as illustrated in the Figure 5 below.

For the purpose of drawing conclusion whether the path coefficients are statistically significant or not, bootstrapping techniques embedded in this study with Smart PLS 3.0. As reported in Table 9, the T-Values with each path coefficient were determined using bootstrapping technique and P-Values subsequently were generated. The hypothesis H_{1a} (Management leadership) does not have significant effect on sustainable performance (β = -0.022, t = 0.431, p > 0.1). In contrast, benchmarking for H_{1b} (β = 0.171, t = 2.731, p < 0.01) has significant effect on sustainable performance. In the case of hypothesis H_{1c} (β = 0.467, t = 6.815, p < 0.01), Continuous process improvement has a positive significant effect on sustainable performance making both hypotheses supported.

Table 9. The Results of the Inner Structural Model.

Hypothesis	Path Coefficient	T Statistics	P Value	Decision
H1a: ML -> SP	−0.022	0.431	0.333	Not supported
H1b: BM -> SP	0.171	2.731	0.003	Supported
H1c: CP -> SP	0.467	6.815	0.000	Supported
H1d: SD -> SP	0.140	2.800	0.003	Supported
H1e: HRM -> SP	0.063	1.075	0.141	Not supported
H1f: QA -> SP	0.108	2.215	0.014	Supported
H1g: IA -> SP	0.146	2.574	0.005	Supported
H2: ERP -> SP	0.002	0.044	0.482	Not supported
H3: OEC -> SP	0.119	2.081	0.019	Supported

Note: *Management Leadership (ML), Service Design (SD), Human Resources Management (HRM), Benchmarking (BM), Continuous Process Improvement (CP), Quality Assurance (QA), Information and Analysis (IA), Organizational Excellence (OEC), Environmental Regulation and Policy (ERP), Sustainable Performance (SP)*

The result ($\beta = 0.140$, $t = 2.800$, $p < 0.01$) showed that service design has a positive significant effect on sustainable performance making hypotheses H_{1d} to be supported. On the other hand, human resources management has values of ($\beta = 0.063$, $t = 1.075$, $p < 0.01$) to be positively insignificant in the relationship with sustainable performance. This makes hypothesis H_{1e} not to be supported. Furthermore, the effect of quality assurance on sustainable performance was examined and the result found significant relationship. Thus, the hypothesis H_{1f} ($\beta = 0.108$, $t = 2.215$, $p < 0.01$) is supported. In Information and analysis, H_{1g} ($\beta = 0.146$, $t = 2.574$, $p < 0.01$) is supported for the relationship between Information and analysis and sustainable performance. The result ($\beta = 0.002$, $t = 0.044$, $p < 0.1$) showed that, environmental regulation and policy has no significant effect on sustainable performance. Hence, the hypothesis H_2 is not supported. The relationship between organizational excellence and sustainable performance is significant with the result ($\beta = 0.119$, $t = 2.081$, $p < 0.01$) and therefore, the result supports the hypothesis of the study postulated in H_3.

As it is normal that the self-assessment showed high performance, this study revealed that the respondents criticized the current performance in food and beverage companies which is a reflection of the problem of the study. Also, the small values of standard deviation indicated the fact that this perception is virtually agreed upon among most managing directors of food and beverage companies.

Testing the mediating effect of organizational excellence

Based on the theoretical framework of this study, the mediating effect of organizational excellence has been proposed between TQM (comprising ML, BM, CP, SD, HRM, QA and IA) as a construct and sustainable performance. Smart PLS 3.0 was used to examine the mediating effect of organization excellence between the independent variable and dependent variable. The Table 10 presents the results from the hypothesis.

Table 10. Testing the mediating effect of organizational excellence.

Hypothesis	Path Coefficient	T Statistics	P Value	Decision
H4: TQM*OEC -> SP	0.220	3.050	0.001	Supported

Table 11. Testing the Moderating Effect of Environmental Regulation and Policy.

VARIABLE	Original Sample (O)	T Statistics (|O/STDEV|)	P Values
H5: Moderating Effect 1 -> SP	−0.012	0.177	0.430
ERP -> SP	0.002	0.041	0.484

Environmental Regulation and Policy (ERP), Sustainable Performance (SP)

The results showed that there is a mediating effect of Organizational excellence between these quality practices regarded as Total Quality management (TQM) elements and sustainable performance with the value ($\beta = 0.220$, $t = 3.050$, $p > 0.01$). Therefore, the hypothesis H_4 was supported.

Testing the moderating effect of environmental regulations and policy

According to the theoretical framework of this study, the moderating effect of environmental regulation and policy has been proposed between the TQM elements and sustainable performance. For testing the moderating effect of environmental regulation and policy, Smart PLS 3.0 was used to examine the effect. As illustrated in Table 11, the results showed that there is no moderating effect of environmental regulation and policy in the relationship between the independent variable and sustainable performance at the 0.01 level of significance (β = -0.012, $t = 0.177$, $p < 0.01$). Therefore, the result does not support hypotheses of the study as postulated in H_5.

Discussion

The introductory section of this study revealed the potential causes of the challenges behind Malaysia food and beverage industry. This could be as a result of lack of moderator and mediator in the relationship between TQM practices and sustainable performance in the past studies. Therefore, a model which integrates several quality practices into a single model is presented. This is one of the studies that consider the mediating and moderating effects of organizational excellence and ERP respectively on the relationship

between TQM practices and sustainable performance. Through a review of literature, this proposed model is developed to provide a deeper understanding to practitioners and academics on the factors of quality management to achieve sustainable performance as mediated and moderated by excellence and governmental regulations and policy in order to enable decision and policy-makers to achieve environmental, economic and social sustainability. This analysis is equally considered as preliminary of the study which shows that the variables are correlated and appropriate to be used the study.

Discussion of the results

Although, it has been argued that sustainable performance is dependent on the management leadership (Ireland and Hitt 2005), the leaders of FBC need strategy to design the suitable trainings for top managers and workers in order to improve achieve transformational leadership through leadership skills. The result showed that there is awareness among the leaders of FBC on the critical responsibilities of implementing strong leadership styles and developing TQM practices to achieve their objectives which is to enhance sustainable performance. Additionally, this result indicates that long term quality plans and clear quality goals are required from top management leaders.

The positive effect of benchmarking on sustainable performance in FBC can be explained from the fact that there is presence of benchmarking practices with other competitors within and outside the industry. This implies that there exists a perception and culture among managers of FBC on their better performance than other organizations by implementing modern practices and strategies in order for them to avoid more benchmarking than others. However, this culture of benchmarking has great effect on increase in sustainable performance. Therefore, FBC should continue to consider benchmarking as the strategy to achieve the best competitive advantage. The FBC should further conduct researches to find the best practices for both local and international companies within the industry.

In rapid urbanization needs, FBC should be continuously sensitive to the constituent needs for more successful implementation of TQM practices, managers and employees; FBC should plan and implement a comprehensive continuous process improvement programs that involve all members and levels in the organization. The TQM practice in FBC should involve all the processes and functions integrated to meet customer needs and achieve the desired continuous process improvement (Ganiyu, Uche, and Elizabeth 2012). The presence of continuous training indicates how high speed of improvement is achieved. Therefore, training, involvement, process quality, company products and services, feedback system are the best practices to enhance the continuous process improvement to cover all management practices (Benavent, Ros, and Moreno-Luzon 2005).

The result shows that, there is existence of service design before processing and marketing which indicates satisfied beneficiaries. In brief, the result shows that there is involvement from all the employees when designing new service from all other employees in different departments. The findings from this result on HRM practices reveal that the industry should focus more on how the employees can be encouraged to achieve quality performance in terms of team management, evaluation of employees' suggestion, providing proper training, empowering employees and indulging them to apply their initiatives when dealing with complaints from the customers.

For the sake of improving the assurance of quality, FBC of Malaysia should look again at their policies and reengineer them if needed, and in turn link them to the capabilities of their employees to enhance the quality of their service. The results showed the proper reviewing of the quality assurance before introducing and marketing which reflects satisfied customers. The results also indicated participation of managers when planning and designing the new service from employees in different departments of Malaysian FBC. Similarly, industries such as food and beverage companies with better infrastructure of information systems would be able to control the quality of information systems that leads to better sustainable performance. The significant and positive results indicate the awareness of the managers of the companies on the significance of information and analysis. Summarily, the findings on the practices of information and analysis showed that most of these companies have advanced programs that can reduce the service time.

This result shows the lack of awareness of the importance of regulations and policy to enhance sustainable performance. Most companies under the food and beverage industry do not appreciate the significant and positive effect of ERP on resulting to work efficiency and fulfillment in spite the simplicity of ERP system as reported by from many researchers. However, despites the insignificant of ERP in FBC on sustainable performance, the results of this study

indicates that there are some factors of ERP which led to the outcome of the study.

The past study on the relationship between organizational excellence and sustainable performance showed that to achieve high performance, excellence is precedence for any organization and organizations are helped to improve and enhance their sustainable performance through the organizational excellence models. The significant and positive results also indicate the importance of encouraging innovation among employees, focusing on customers and how sustainable performance is increased by personnel commitment. Furthermore, this result substantiates the logical use of organizational excellence as a practice that can support organizations in enhancing performance through effective implementation of management leadership (Kaur, Singh, and Ahuja 2012). In another vein, organizational excellence in this study plays the role of a mechanism that gives explanation on the effect of management leadership on sustainable performance.

Some studies previously confirmed the positive relationship between TQM and sustainable performance from one view, and ERP from other view. Therefore, the collective impacts of these variables on sustainable performance is logically proposed but not confirmed in this study. The result also does not reflect the importance of the regulation and policy as a mechanism that can explain the effect of TQM practices to improve sustainable performance through organizational excellence. The result reflects lack of awareness of FBC in following regulations and policy in their daily work.

Conclusions

Contribution of the study

The presentations of results in Table 6, 7 and 8 revealed that all the constructs considered in this study are properly measured through statistical significance and parameter estimate (Chow and Chan 2008). One of the objectives of this analytical study is to validate the research items and establish their reliability respectively which is quite achieved. Till date, this present study is one of the few studies conducted in Asia to evaluate the join relationship between the variables considered in line with sustainable performance in agro-allied industry. Similarly, this study attempted to expand and strengthen the boundary of the existing knowledge by examining the mediating and moderating effects of organizational excellence and ERP on the link between quality practices and sustainable performance respectively using PLS SEM analysis.

Theoretical implications

Theoretically, this preliminary analysis contributes to literate under TQM by re-investigating the unresolved issues concerning association between TQM practices and sustainable performance. Also, this study significantly contributes to the literature by incorporating organizational excellence as an innovative strategy and practice coupled with ERP in the theoretical model to better explain the variance in the construct on sustainable performance. Furthermore, the inconsistencies in the past studies on TQM and sustainable performance prompted the study to consider excellence and ERP as intervening variables in the study to better explain the relationship. The result shows that organizational excellence as a construct has significant relationship with the TQM elements and sustainable performance. In contrast, ERP shows no significant relationship with the two construct moderated. Additionally, the result can create awareness in the industry to follow rules and policy which involves innovation, customer focus, safety of human life when implementing quality practices. The past study on the relationship between organizational excellence and sustainable performance showed that achieving high performance by any organization requires excellence and organizations are helped to improve and enhance their sustainable performance through the organizational excellence models.

Managerial implications

The results of the present study have significant contributions and implications for managers, practitioners, and policy makers. There are many advantageous insights on how quality management practices, organizational excellence and ERP can enhance the overall sustainable performance. Some of these practical implications are as follow:

First, the findings of this study suggested that BM, QA, CPI, SD and IA should be effectively incorporated in Malaysian food and beverage companies. In addition, the industry policy-makers should pay an attention to restructure the strategies, practices, and policies to be aligned with the technological advancements and implementing managerial strategies. The integration of strategies such as Process quality, company products and services, feedback system can help agro-allied industry as a whole to increase its performance and achieve the optimum competitive advantages.

Secondly, due to the inconsistent in the previous study about the effect of TQM on sustainable performance,

organizational excellence and environmental regulation and policy are introduced in this study to explain the practices in a better way. Although, the findings reported insignificant effect in the moderation of ERP, nevertheless, the results show the importance of organizational excellence as a practice to achieve in order to increase and enhance sustainable performance. In addition, the results increase the awareness in food and beverage companies (FBC) to follow rules and regulations of excellence models which involves life safety, innovation and customer focus when implementing TQM practices. Environmental regulation and policy as a practice on the other hand in food and beverage companies can also lead to higher performance with desire and a result from practicing other initiatives. Moreover, FBC should excel when dealing with other strategies and practices to actualize their mission and obtain the planned goals.

This study also gives some insights to public, manufacturing and service organizations in Malaysian and Asean region. For example, other industries in Malaysia or other Asian countries can take this study as a guideline when striving for excellence. In other words, FBC whether in Malaysia or outside can have many practical benefits from this study. The extensive literature and arguments, and the results should be taken into consideration from other industries to enhance their performance. In this study, the most important factors were discussed such as ML, BM, CP, SD, HRM, QA, IA, organizational excellence and ERP that are necessary nowadays for any organization that wants to achieve success and competitive advantages. In some companies, TQM practices were implemented but without having information system to link the whole departments, others have systems but not having strategies and practices such as QA and CPI. Therefore, the integration of these strategies and practices will help FBC to enhance their performance through implementation of the suggested constructs in this study concurrently. Lastly, private sectors can have a great value from the findings of this study.

Limitation and future research

This study is limited to the context of food and beverage industry but does not include other agro-allied companies in Malaysia. The result of this study cannot be generalized as the unit of the analysis in this study is any top personnel in the company that can replace the managers. It would be difficult to generalize the results to other sectors, private or public organization even though the food and beverage companies are one of the main industries in Malaysia. Additionally, this study is limited to the soft elements of TQM in agro-allied industry. Future researchers therefore, are encouraged to examine more hard and social practices and aspects to empirically validate the proposed model of the study. Also, a cross-sectional approach is used as data collection of this study at one point in time exclusive preliminary analysis. A longitudinal research could be employed due to the complexity of the joint effects in the strategies of this study such as the quality practices, organizational excellence, environmental regulation and policy and sustainable performance. Over a long period of time, a longitudinal research method can better explain the relationships and the variables' development could be explained to detect the changes in the relationship between the variables over time.

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